atively high sound absorption with low sound transmission characteristics, with little or no sacrifice of strength or fire resistance. Most of these special units have a perforated face shell with the adjacent hollow cores filled at the factory with a fibrous glass pad. Perforations may be circular or slotted, uniform or variable in size, and regular or random in pattern (*see Fig. 8-45*). Some proprietary units have NRC ratings from 0.45 to as high as 0.85, depending on the area and arrangement of the perforations (*see Fig. 8-46*).

Sound absorption and sound reflection are directly related. If at a given frequency a particular material absorbs 75% of the incident sound, it will reflect the remaining 25%. In acoustical design, sound reflection is just as important as absorption. If too much absorption is provided, or if it is concentrated, the result will tend to "deaden" sound. Too little absorption will cause reverberation, or the persistence of sound within a room after the source has stopped. In excess, this is the principal defect associated with poor acoustics. The optimum reverberation time, which varies with room size and use, can be obtained by controlling the total sound absorption within a room. Alternating areas of reflective and absorptive materials will "liven" sound, promote greater diffusion, and provide better acoustics. Special sound-absorbing masonry units can be alternated with conventional units to achieve this effect.

8.8.3 Sound Transmission

Although it is an important element in control of unwanted noise, sound absorption cannot take the place of sound insulation or the prevention of noise transmission through building elements. The NRC rating ranks wall

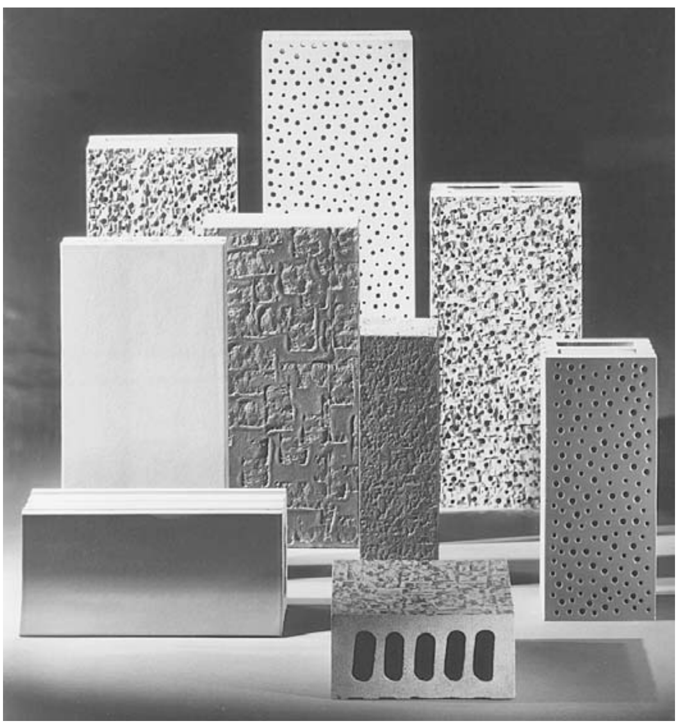
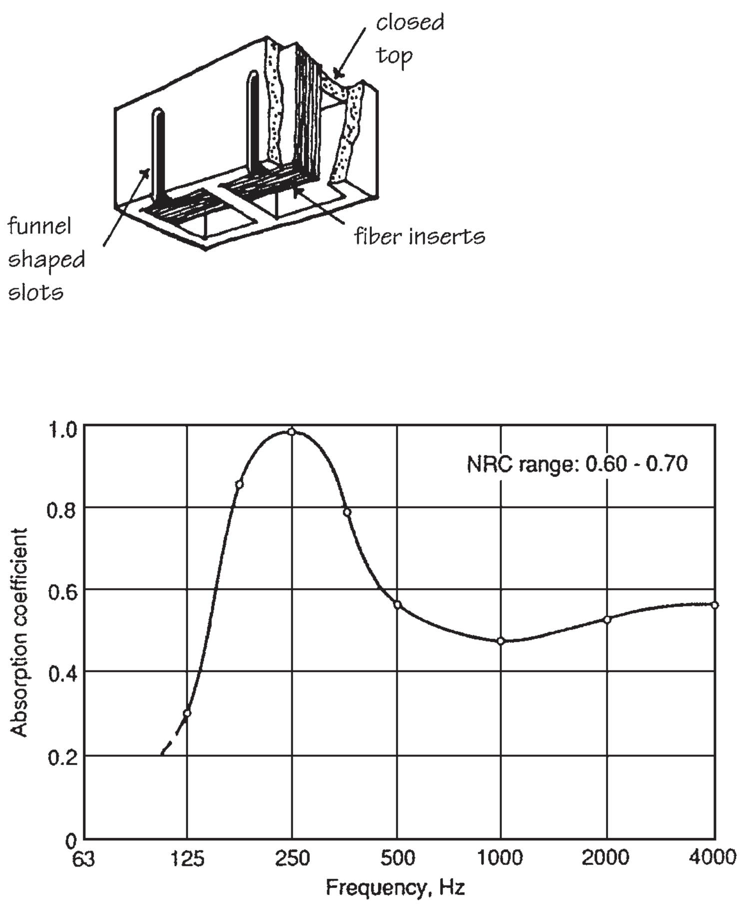


Figure 8-45 Acoustical tiles (back row and right) have different face patterns. (*Photo courtesy Stark Ceramics, Inc.*)



(*From* Concrete Masonry Handbook, *Portland Cement Association*)

Figure 8-46 Sound absorption test data for concrete masonry "sound block."

systems only by sound absorption characteristics and does not give any indication of effectiveness in the control of sound transmission.

Sound energy is transmitted to one side of a wall by air. The impact of the successive sound waves on the wall sets it in motion like a diaphragm. Through this motion, energy is transmitted to the air on the opposite side. The amount of energy transmitted depends on the amplitude of vibration of the wall, which in turn depends on four things: (1) the frequency of the sound striking the surface, (2) the mass of the wall, (3) the stiffness of the wall, and (4) the method by which the edges of the wall are anchored. The *sound transmission loss* (STL) of a wall is a measure of its resistance to the passage of noise or sound from one side to the other. If a sound level of 80 dB is generated on one side and 30 dB is measured on the other, the reduction in sound intensity is 50 dB. The wall therefore has a 50-dB STL rating. The higher the transmission loss of a wall, the better is its performance as a sound barrier.

8.8.4 STC Ratings

Until the early 1960s, the most common sound rating system was the arithmetic average of STL measurements at nine different frequencies. Heavy walls have a relatively uniform STL curve and are satisfactorily classified by